

# **Tacoma-Pierce County Health Department Antibiotic Resistance Program**

## **Year 2001 Annual Report**

Resistance to antibiotics among bacterial pathogens has the potential to reverse some of the most important medical advances of the 20<sup>th</sup> century. As we move into the new millennium and face new and reemerging public health threats, maintaining the power of antibiotics to cure disease is of critical importance. While antibiotic resistance is a problem of international scope, it is largely driven by local factors. The Tacoma-Pierce County Health Department (TPCHD) began to address the problem of antibiotic resistance in earnest in 2000, with the establishment of the Antibiotic Resistance Program. The centerpiece of this program is the Pierce County Antibiotic Resistance Task Force, which is a partnership between the Health Department and various community providers, agencies, the military, and businesses.

The Task Force has undertaken epidemiologic research and developed a number of interventions for addressing the problem of antibiotic resistance, including educational materials. Towards the end of 2001 the Task Force began to integrate a social marketing strategy in order to influence personal behavior while benefiting the community at large. The primary focus of marketing is consumer-driven and utilizes research to identify the needs, wants and perceptions of the target audience. The data obtained is the driver in designing the marketing mix. As we move into 2002, this framework will be used to govern the marketing strategy for the antibiotic resistance program.

This report will describe the epidemiology of some of the major resistant pathogens in Pierce County and describe program activities and accomplishments based on the goals that were set for 2001.

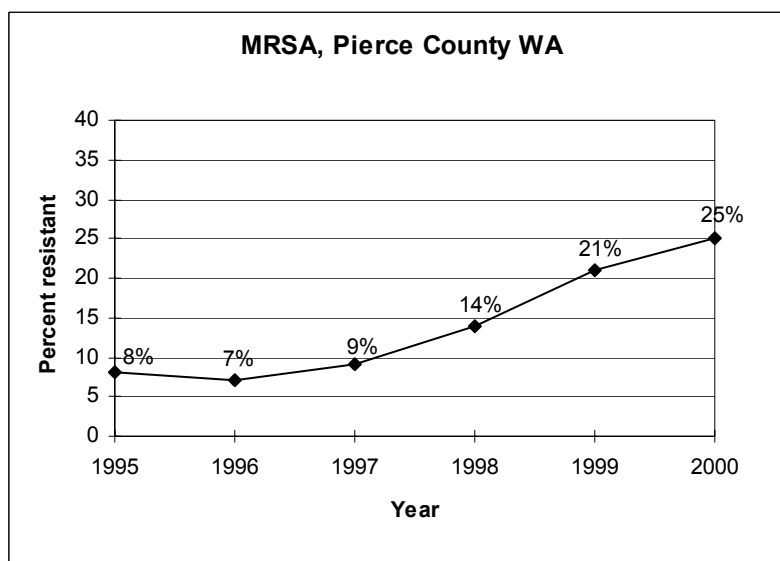
## **Epidemiology of Antibiotic Resistance in Pierce County**

Throughout 2001 the major hospitals and several long-term care facilities in Pierce County reported cases of methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant enterococci, and drug-resistant *Streptococcus pneumoniae* to TPCHD. The hospitals also provided historical data dating as far back as 1995. These data indicate not only increasing antibiotic resistance in some important pathogens, but a substantial burden in terms of the number of resistant infections that occurred during the year.

### **METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS***

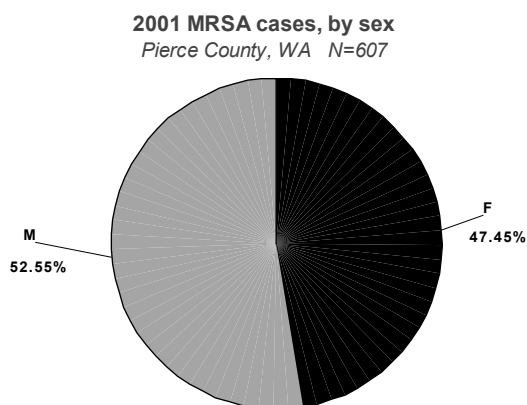
Methicillin-resistant *Staphylococcus aureus* (MRSA) is the most prevalent resistant pathogen in acute care settings. *S. aureus* a common component of the skin flora in healthy individuals, but can be pathogenic if it enters wounds, urine, the lungs, or normally sterile body sites. In Pierce County the percent of *S. aureus* isolates resistant to methicillin rose from 8% in

1995 to 25% in 2000. MRSA is considered resistant to all penicillins and is often resistant to all beta-lactams and other classes of antibiotics, making it particularly difficult to treat.



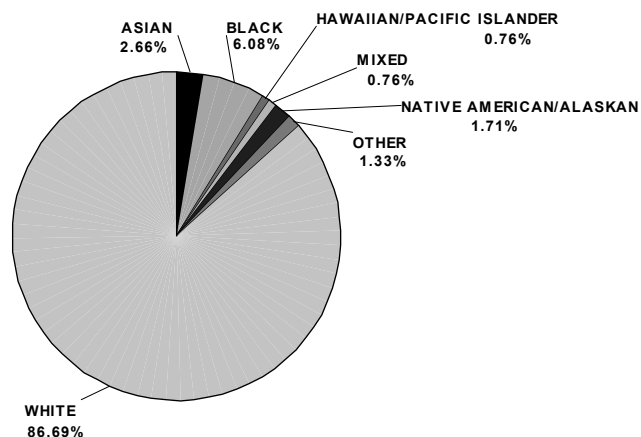
### Epidemiology of MRSA in Pierce County

In 2000, 696 cases of MRSA (unduplicated count) were reported to TPCHD by hospitals and long-term care facilities. This number is likely to be an underestimate of the full burden of MRSA in the county because reporting was voluntary and data were solicited from only a segment of health care providers. Patients with MRSA were 53% male, 87% white, 6% black, 3% Asian, 2% Native American/Alaskan, 1% Hawaiian/Pacific Islander, and 1% mixed race. The majority of cases (56%) were in persons over the age of 65. Seventy-six percent were first reported by hospitals, 14% by long-term care facilities, and 7% by outpatient clinics and emergency departments (these figures do not necessarily indicate where the relative burden of cases exists, but are a factor of reporting).

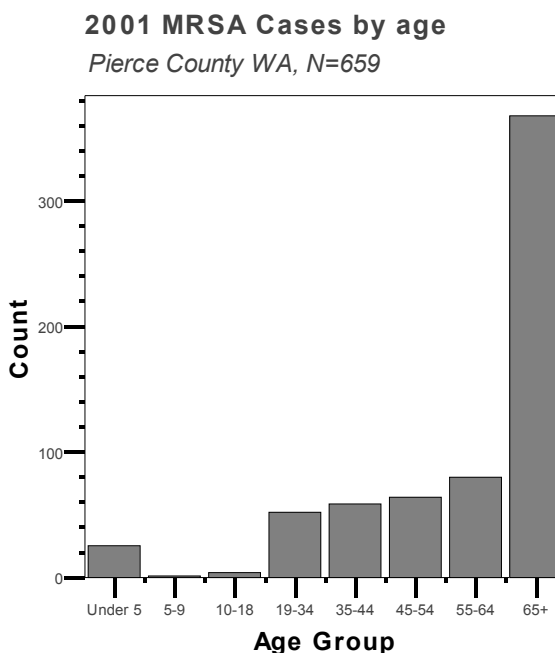


### **2001 MRSA cases, by race**

Pierce County, WA N=526

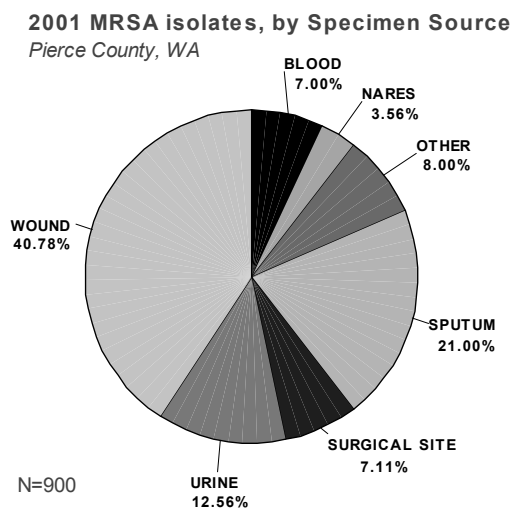


MRSA by Age		
Age	# of cases	% of cases
Under 5	26	3.9
5-9	2	.3
10-18	5	.8
19-34	53	8.0
35-44	59	9.0
45-54	65	9.9
55-64	81	12.3
65+	368	55.8
Total	659	100.0



### Microbiological characteristics of MRSA in Pierce County

A total of 906 MRSA isolates were reported from the 696 cases. The most common site of infection was wounds (41%), followed by respiratory infections (21%).

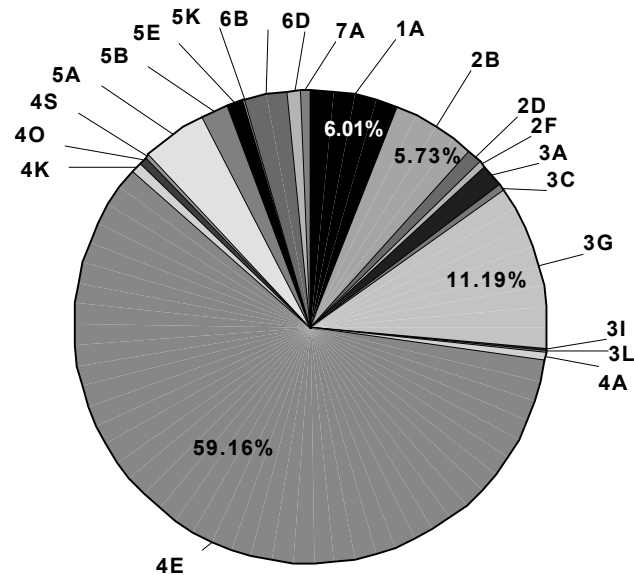


MRSA strains were defined by susceptibility profiles involving 8 drugs: oxacillin (which indicates resistance to methicillin and other penicillins), clindamycin, erythromycin, gentamicin, levofloxacin, rifampin, tetracycline, and vancomycin. Full information was available for 715 isolates (with some patients having more than one isolate reported, occasionally with different

strain patterns). Ninety-four percent of these isolates were resistant to 2 or more of the 8 antibiotics, and 73% percent were resistant to 4 or more. Five isolates were resistant to all drugs except vancomycin. Twenty-one different phenotypic strain patterns were identified based on these drugs.

### 2001 MRSA isolates, by Strain

Pierce County, WA N=715

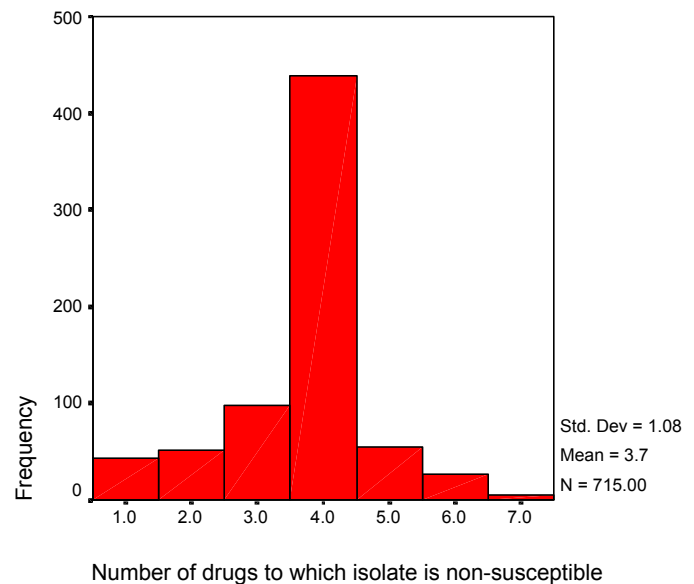


Strain	Clinda- mycin	Erythro- mycin	Genta- micin	Levo- floxacin	Oxa- cillin	Rifam- pin	Tetra- cycline	Vanco- mycin	# of isolates	% of isolates
2D	S	S	S	R or I	R	S	S	S	7	1.0
2F	S	S	S	S	R	S	R or I	S	3	.4
3A	R or I	R or I	S	S	R	S	S	S	12	1.7
3C	R or I	S	S	R or I	R	S	S	S	3	.4
3G	S	R or I	S	R or I	R	S	S	S	80	11.2
3I	S	R or I	S	S	R	S	R or I	S	1	.1
3L	S	S	R or I	S	R	S	R or I	S	1	.1
4A	R or I	R or I	R or I	S	R	S	S	S	4	.6
4E	R or I	R or I	S	R or I	R	S	S	S	423	59.2
4K	S	R or I	R or I	R or I	R	S	S	S	5	.7
4O	S	R or I	S	R or I	R	S	R or I	S	4	.6
4S	S	S	R or I	R or I	R	S	R or I	S	2	.3
5A	R or I	R or I	R or I	R or I	R	S	S	S	32	4.5
5B	R or I	R or I	S	R or I	R	R or I	S	S	13	1.8
5E	R or I	R or I	S	R or I	R	S	R or I	S	8	1.1
5K	S	R or I	R or I	R or I	R	S	R or I	S	1	.1
6B	R or I	R or I	R or I	R or I	R	S	R or I	S	21	2.9
6D	R or I	R or I	S	R or I	R	R or I	R or I	S	6	.8
7A	R or I	R or I	R or I	R or I	R	R or I	R or I	S	5	.7

S = Susceptible I = Intermediate R = Resistant

### Number of drugs to which isolates were non-susceptible

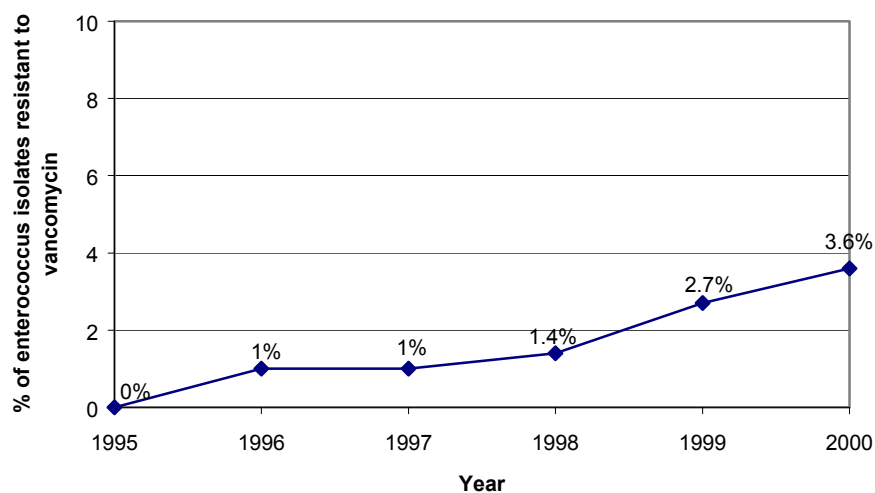
# of drugs to which isolate is resistant or intermediate	# of isolates	% of isolates
1	43	6.0
2	51	7.1
3	97	13.6
4	438	61.3
5	54	7.6
6	27	3.8
7	5	.7
Total	715	100.0



### VANCOMYCIN-RESISTANT ENTEROCOCCI

Vancomycin-resistant enterococci (VRE) include *Enterococcus faecium* and *Enterococcus faecalis*. These 2 species are common in the gastrointestinal tract of healthy individuals, but can cause infection in wounds, urinary tract, and normally sterile body sites. In Pierce County the percent of enterococci resistant to vancomycin increased from 0% in 1995 to 3.6% in 2000. While this number appears low, the impact can be significant due to the high cost of the few available drugs which can effectively treat VRE.

VRE Pierce County 1995-2000

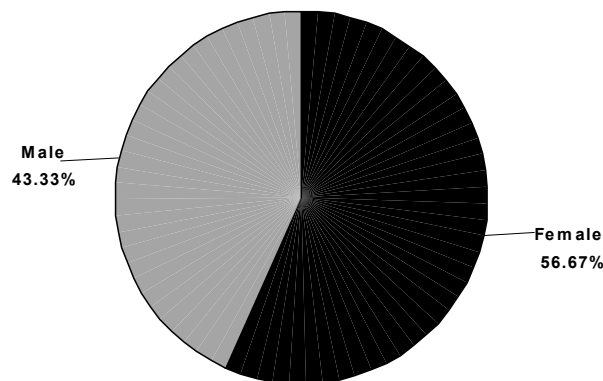


## Epidemiology of VRE in Pierce County

In 2000, 32 cases of VRE (unduplicated count) were reported to TPCHD by hospitals and long-term care facilities. This number is likely to be an underestimate of the full burden of VRE in the county because reporting is voluntary and data was solicited from only a segment of health care providers. Patients with VRE were 43% male, 87% white, 4% black, and 9% Native American/Alaskan. All cases were in persons over the age of 35, with 55% in persons over age 65.

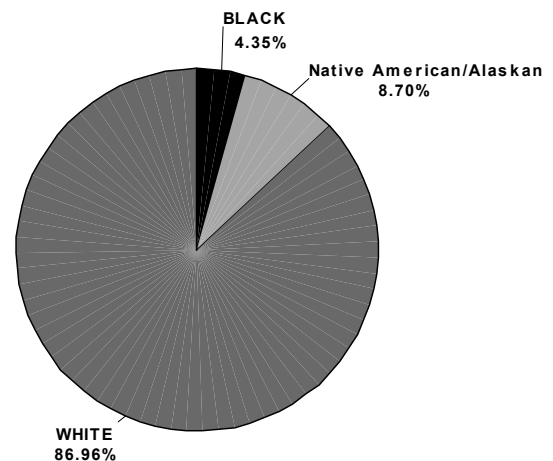
**2001 VRE cases, by sex**

Pierce County, WA N=30



**2001 VRE cases, by race**

Pierce County, WA N=23

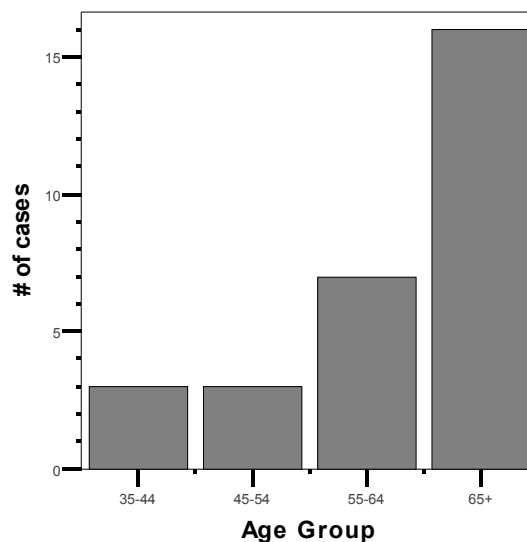


**Age distribution of VRE cases**

Age	# of cases	% of cases
35-44	3	11.1
45-54	2	7.4
55-64	6	22.2
65+	16	59.3
Total	27	100.0

**2001 VRE Cases by age**

Pierce County WA, N=29



## Microbiological characteristics of VRE in Pierce County

A total of 37 isolates were reported for the 32 cases of VRE. All but two hospitals in the county reported at least one isolate of VRE. The most common site of infection was the urinary tract (47%), followed by surgical sites (19%).

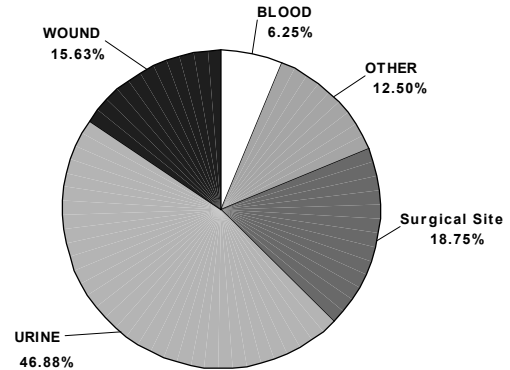
VRE is usually resistant to multiple classes of antibiotics. The table below shows the susceptibility to various drugs of VRE isolates in Pierce County. Resistance to most classes of drugs is high, and even drugs with good in vitro activity against VRE have limited clinical utility due to pharmacological factors. Linezolid and Synercid are generally the drugs of choice for treating VRE; however, susceptibility to these drugs is not routinely tested nor reported.

### Antibiotic susceptibility of VRE isolates, Pierce County 2001

ANTIBIOTIC	% Susceptible	% Intermediate	% Resistant
Ampicillin	5	0	95
Chloramphenicol	100	0	0
Ciprofloxacin	0	0	100
Gentamicin	48	0	52
Levofloxacin	5	5	91
Nitrofurantoin	91	9	0
Penicillin	4	0	96
Tetracycline	59	0	41

### 2001 VRE cases, by source of specimen

Pierce County, WA N=32



## **DRUG-RESISTANT *STREPTOCOCCUS PNEUMONIAE* (DRSP)**

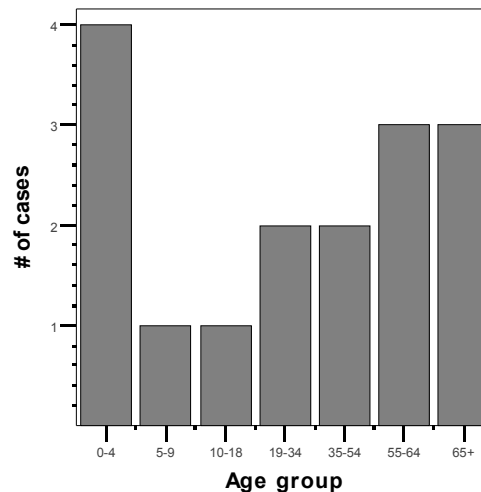
*Streptococcus pneumoniae* is a common cause of pneumonia, ear infections, and bloodstream infections. The penicillins have long been the mainstay of treatment for *S. pneumoniae* infections. Increasing resistance nationwide is eroding the effectiveness of these first-line drugs. In Pierce County, resistance in *S. pneumoniae* to penicillin rose from 5% in 2000 to 9% in the first half of 2001. It is unknown if this is an ominous trend or a chance aberration, but data from the 2<sup>nd</sup> half of 2001 (not available at the time of this printing) should elucidate this.

## Epidemiology of DRSP in Pierce County

In 2000, 25 cases of DRSP (unduplicated count) were reported to TPCHD by hospitals. This number is likely to be an underestimate of the full burden of DRSP in the county because reporting was voluntary and data were solicited from only a segment of health care providers. The majority of cases were in children under 5 years of age (25%) and in persons over 55 (38%).

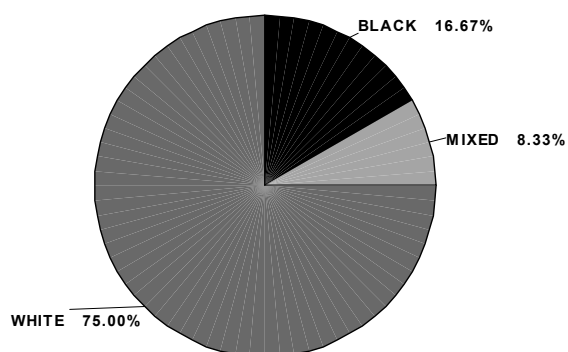
DRSP		
Age	# of cases	% of cases
0-4	4	25.0
5-9	1	6.3
10-18	1	6.3
19-34	2	12.5
35-54	2	12.5
55-64	3	18.8
65+	3	18.8
Total	16	100.0

**2001 DRSP Cases by age**  
Pierce County WA, N=16

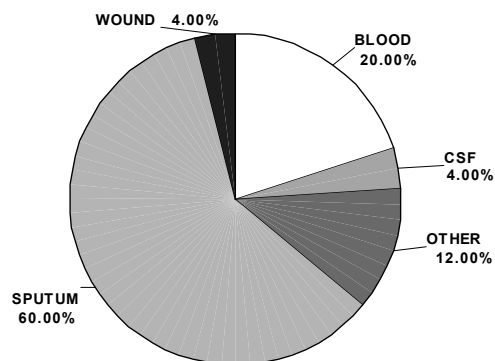


Patients with DRSP were 57% male, 75% white, 17% black, 8% mixed race. African Americans and individuals of mixed race appear to be disproportionately affected based on the racial profile of the county, although the differences are not statistically significant. Over half (60%) the DRSP infections were respiratory, while more than one quarter were invasive infections: 20% were bloodstream infections and 4% involved cerebrospinal fluid.

**2001 DRSP cases, by race**  
Pierce County, WA N=12



**2001 DRSP cases, by source of specimen**  
Pierce County, WA N=25



## Microbiological characteristics of DRSP

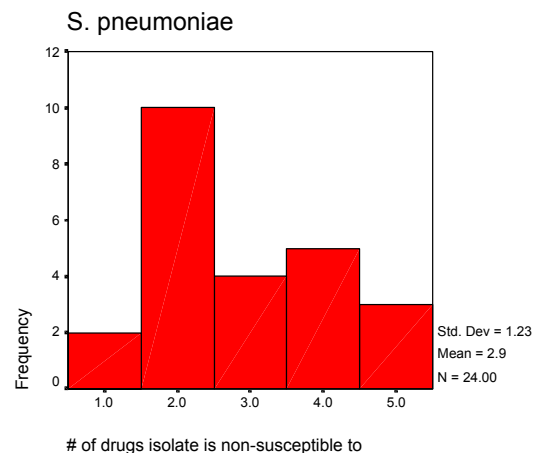


Of the 25 cases of DRSP reported all were, by definition, resistant to at least one antibiotic. Of those with detailed susceptibility data available, 44% were fully resistant to penicillin, with another 24% demonstrating intermediate resistance. Of the 17 isolates that were non-susceptible to penicillin (i.e., either resistant or intermediate), 5 were non-susceptible to either ceftriaxone or cefotaxime, 11 were non-susceptible to a macrolide, 9 were non-susceptible to a fluoroquinolone. All were susceptible to vancomycin (note that *not* all penicillin-resistant isolates were tested against all other drugs).

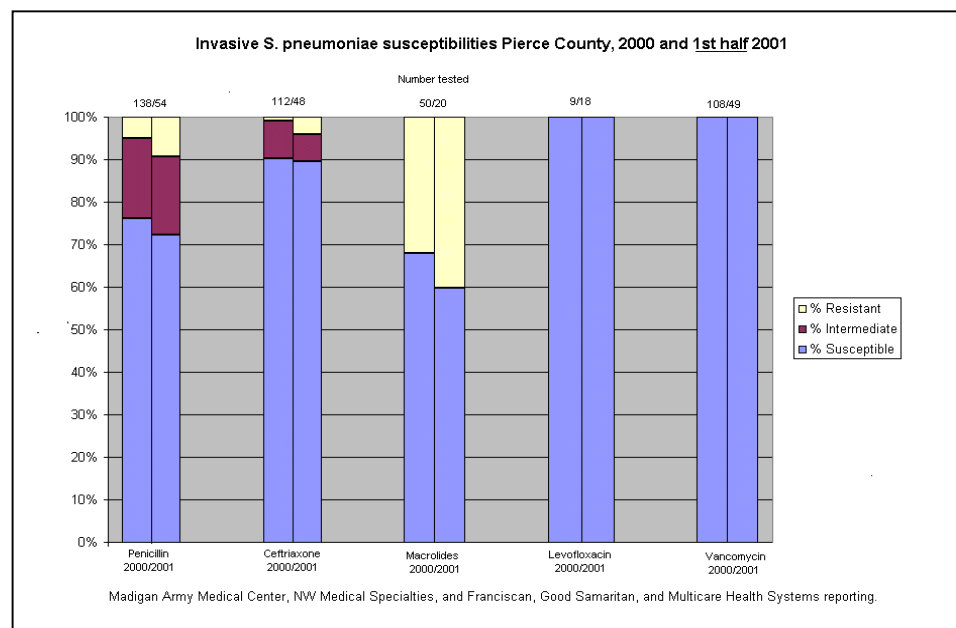
Of these 5 classes of drugs (penicillins, 3<sup>rd</sup> generation cephalosporins, macrolides, fluoroquinolones, and glycopeptides), 92% of the reported isolates were non-susceptible to 2 or more classes, and 50% were non-susceptible to 3 or more.

#### Classes of drugs isolates were non-susceptible to

# of classes	# of isolates	percent of isolates
1	2	8.3
2	10	41.7
3	4	16.7
4	5	20.8
5	3	12.5



In addition to case reports, TPCHD received summary laboratory data on *S. pneumoniae* in 2000 and 2001, which indicated increasing resistance in several classes of antibiotics. (Note that this data was collected by a different method than the above data and includes susceptible isolates in addition to non-susceptible isolates).



# TPCHD Antibiotic Resistance Program

## 2001 Activities and Accomplishments

### PROGRAM GOALS:

1. Describe the epidemiology of antibiotic resistant infections (ARI) in Pierce County.
2. Reduce ARI incidence and transmission.

### PROGRAM OBJECTIVES:

1. Develop and implement a system for collecting laboratory data to track antibiotic resistance patterns in Pierce County.

Purpose: To provide providers with information to assist in prescribing decisions, identify ominous trends, and target prevention activities.

#### Activities and accomplishments in 2001:

- ◆ Developed cooperative working relationships with microbiologists from Madigan Army Medical Center, the VA Hospital, Infections Limited, and MultiCare, Good Samaritan, and Franciscan Health Systems.
  - ◆ Collected data on antimicrobial susceptibility for multiple bacteria–drug combinations from all major labs and combined these into a county-wide antibiogram for 2000, which was disseminated to microbiologists at the major laboratories.
  - ◆ Discovered a lack of standardization in antimicrobial susceptibility testing for *Streptococcus pneumoniae*. In light of rapidly increasing penicillin resistance in this pathogen, concerns were raised over treatment delays leading to excess morbidity and mortality. We facilitated a process that led laboratories to mutually agree to a standard panel for testing and reporting of susceptibilities for all invasive isolates of *S. pneumoniae*.
2. Develop and implement a surveillance system for describing the epidemiology of the most significant resistant pathogens in Pierce County.

Purpose: To identify areas in needs of intervention, identify and contain outbreaks, and enhance understanding of resistance.

- ◆ Established a system whereby hospitals and long-term care facilities report all new cases of methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococcus (VRE), and drug-resistant *Streptococcus pneumoniae* (DRSP) on a monthly basis.
- ◆ Received reports on these pathogens from an average of 15 facilities each month, including the major hospitals and several long-term care facilities.

- ◆ Through these reports, developed an epidemiologic profile of methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant enterococci, and drug-resistant *Streptococcus pneumoniae*, (see attached graphs).
3. Work in partnership with community providers to reduce the emergence and spread of resistance in inpatient, residential care, outpatient, and veterinary settings.

Purpose: To bring expertise within the community to bear upon the issue of antimicrobial resistance and to facilitate the adoption of interventions in local health care and community organizations.

Task Force activities and accomplishments in 2001:

- ◆ TPCHD acted as the lead agency for the Pierce County Antibiotic Resistance Task Force. The entire Task Force met 3 times in 2001 and the 3 committees met approximately monthly through the year. Membership and participation remained high, with several new members joining near the end of 2001.
  - ◆ Created an educational poster and brochures to promote non-antibiotic treatment for the common cold.
  - ◆ Developed and disseminated recommendations on the use of free samples of antibiotics.
  - ◆ Collected data on outpatient antibiotic prescribing in Pierce County.
  - ◆ Developed a manual for controlling antibiotic resistant organisms in a variety of health care and community settings, including long-term care facilities, hospitals, primary care clinics, dental clinics, schools and child care centers, veterinary clinics, and psychiatric facilities. This manual will be released in 2002.
  - ◆ Developed a position statement on the use of antibacterial household products and worked collaboratively with the TPCHD Handwashing Campaign to incorporate a message about antibacterial soaps.
  - ◆ Assisted in developing and refining surveillance systems.
  - ◆ Initiated a research study of vancomycin susceptibility in methicillin-resistant *Staphylococcus aureus* in dialysis patients and diabetics.
  - ◆ Promoted discussion of the relationships between human health and animal health vis-à-vis antibiotic resistance.
  - ◆ Wrote a grant proposal for a 2-year project to link human and animal laboratory data on antibiotic resistant pathogens, survey agricultural producers on antibiotic use and infection control practices, and implement and evaluate interventions for improving infection control and reducing antibiotic use in livestock. The proposal was recommended for funding by the selection committee, and pending final approval we expect to receive \$331,000 for this project in later summer 2002.
4. Provide education to the public and to health care providers on antimicrobial resistance prevention.

Purpose: To enhance understanding of the consequences of inappropriate antibiotic use and ineffective infection control, in order to promote judicious use of antibiotics and strengthen infection control activities.

Activities and accomplishments in 2001:

- ◆ Surveyed infection control practitioners in acute and long-term care facilities on resources and knowledge of antibiotic resistance. Surveyed adults and youth on knowledge of antibiotics, antibiotic resistance, and treatment for the common cold. The results of these surveys guide the marketing strategy and evaluate success.
- ◆ TPCHD staff gave presentations on antibiotic resistance at several local and statewide conferences attended by health care providers and public health professionals, including the Washington State Joint Conference on Health, Premera Blue Cross Symposium on Antibiotic Resistance, and Pierce County Annual Infectious Disease Day.
- ◆ Discussed the issue of antibiotic resistance with Rosa Franklin, President Pro-tem of the State Senate.
- ◆ Disseminated educational posters and brochures to the public via health care providers, pharmacies, and schools.

5. Collaborate with the State Department of Health on issues of antimicrobial resistance.

Purpose: To create complementary activities at both the state and county levels, to take advantage of expertise within the DOH, and facilitate the statewide dissemination of Pierce County antimicrobial resistance strategies.

Activities and accomplishments in 2001:

- ◆ Participated in the Washington Alliance Working for Antibiotic Resistance Education (AWARE) by assisting with the development and dissemination of educational materials for health care providers.
- ◆ Collaborated with Washington Department of Health in sharing and disseminating educational materials.
- ◆ Participated in a state coalition planning a joint educational campaign for Fall 2002.

6. Other activities

- ◆ Provided MRSA specimens to the CDC for a study of resistant organisms in Native American populations.
- ◆ Provided expert consultation to a statewide laboratory initiative on antimicrobial susceptibility testing.
- ◆ Provided expert consultation and advice to community providers on controlling antibiotic resistance, upon request.